

AD-A194 884

SUPPORTING FORWARD IN THE HEAVY DIVISION: DO
SUSTAINMENT EFFORTS REPRESENT. (U) ARMY COMMAND AND
GENERAL STAFF COLL FORT LEAVENWORTH KS SCHOOL. D J ROH

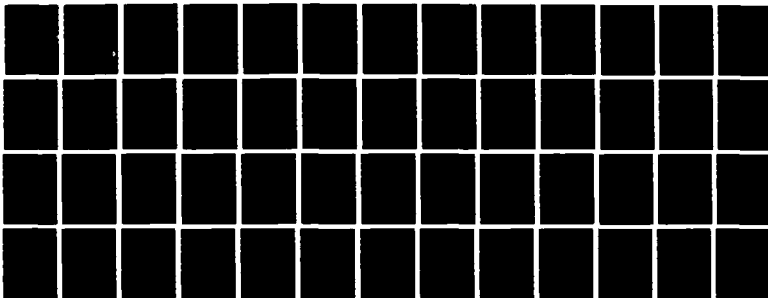
1/1

UNCLASSIFIED

25 JAN 88

F/G 15/6

NL





②

FILE COPY

Supporting Forward in the Heavy Division:
Do Sustainment Efforts Represent an Asset or a Liability
to the Generation and Maintenance of Division Combat Power?

by
Major Daniel J. Roh
Ordnance

School of Advanced Military Studies
U.S. Army Command and General Staff College
Fort Leavenworth, Kansas

25 January 1988

DTIC
ELECTE
JUL 05 1988
S
E
D

"Approved for public release; distribution unlimited."

AD-A194 884

SECURITY CLASSIFICATION OF THIS PAGE

Form Approved
OMB No. 0704-0188

DD Form 1473, JUN 86

Previous editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED

#19 continued...

Finally, the monograph reevaluates U.S. sustainment doctrine in the context of the Wass de Czege Combat Power Model. This model maintains that combat power is the net result of a dynamic tension between two forces acting against each other on the battlefield. The commander decides the outcome of battle by how he combines the firepower, maneuver, protection, and leadership potential of the division in action against the enemy. Sustainment operations bring both capabilities and limitations as they influence these functions of the combat power dynamic. Finally, the monograph concludes that the commander, through his preparations and decisions, determines whether sustainment efforts enhance or degrade division combat power.

Supporting Forward in the Heavy Division:
Do Sustainment Efforts Represent an Asset or a Liability
to the Generation and Maintenance of Division Combat Power?

by
Major Daniel J. Roh
Ordnance

School of Advanced Military Studies
U.S. Army Command and General Staff College
Fort Leavenworth, Kansas

25 January 1988

"Approved for public release; distribution unlimited."

School of Advanced Military Studies
Monograph Approval

Name of Student: Major Daniel J. Roh

Title of Monograph: Supporting Forward in the Heavy
Division: Do Sustainment Efforts
Represent an Asset or a Liability to
the Generation and Maintenance of
Division Combat Power?

Approved by:

Douglas W. Craft
Lieutenant Colonel Douglas W. Craft, MBA

Monograph Director

L. D. Holder
Colonel L. D. Holder, M.A.

Director, School of
Advanced Military
Studies

Philip J. Brookes, Ph. D.

Director, Graduate
Degree Programs

Accepted this _____ day of _____ 198_.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (Reference to this study should include the foregoing statement.)

-1-

ABSTRACT

SUPPORTING FORWARD IN THE HEAVY DIVISION: DO SUSTAINMENT EFFORTS REPRESENT AN ASSET OR A LIABILITY TO THE GENERATION AND MAINTENANCE OF DIVISION COMBAT POWER? by MAJ Daniel J Roh, USA, 47 pages.

→ This monograph evaluates the relationship between combat service support operations and heavy division combat power. It focuses on heavy division operations on a mid- to high-intensity battlefield against a Warsaw Pact threat.

First, it addresses the doctrinal implications for CSS operations on this battlefield. It investigates why there is emphasis on forward oriented sustainment efforts. Included here is a review of current logistics doctrine. This explains how the division expects to achieve forward oriented, responsive support through the six key sustainment functions of fuel, arm, man, fix, and transport the force, as well as protect the sustainment system.

Next, is a brief overview of the Soviet approach to tactical sustainment. This includes the relationship between Soviet sustainment philosophy and their concept of warfighting. Where instructive, comparisons are drawn between Soviet and U.S. sustainment practices.

Finally, the monograph reevaluates U.S. sustainment doctrine in the context of the Wass de Czege Combat Power Model. This model maintains that combat power is the net result of a dynamic tension between two forces acting against each other on the battlefield. The commander decides the outcome of battle by how he combines the firepower, maneuver, protection, and leadership potential of the division in action against the enemy. Sustainment operations bring both capabilities and limitations as they influence these functions of the combat power dynamic. Finally, the monograph concludes that the commander, through his preparations and decisions, determines whether sustainment efforts enhance or degrade division combat power.

Table of Contents

	page
Introduction	1
Overview of Current U.S. Sustainment Doctrine	3
Fuel the Force	7
Arm the Force	9
Man the Force	10
Fix the Force	12
Transport the Force	12
Protect the Force	13
Overview of Soviet Sustainment Doctrine	14
Evaluation of U.S. Sustainment Doctrine in the Context of Combat Power	19
Maneuver Effects	24
Firepower Effects	32
Summary and Conclusions	36
Endnotes	39
Bibliography	44

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	



If there is one phrase that captures the essence of U.S. Army doctrine for Air Land Battle, it is 'support forward'. Across the broad range of CSS efforts, the absolute requirement for forward support appears obvious. The justification is compelling.

Modern warfare on a conventional mid- to high-intensity battlefield promises to be a quick, violent, and highly destructive affair. Large organizations will rapidly consume large quantities of supplies. Highly lethal combat will destroy large quantities of fighting systems. U.S. forces will probably enter the conflict at significant numerical disadvantage. The U.S. must not only destroy threat formations faster, but must also replace critical supplies and lost systems with greater efficiency than the enemy. The bottom line is this: U.S. units must continually develop superior combat power at the time and place of their choosing.

This requirement implies that CSS must go where combat formations go and keep them fighting. But, combat power is more than just highly mobile and lethal combat systems. Combat service support is not just the umbilical that sustains the fighting elements. By the very nature of its proximity in a forward support role, CSS is part of the force. Just as it enhances operations by sustaining the inherent combat potential of an organization, it also introduces burdens that in turn degrade that potential.

This monograph will evaluate the relationship between combat service support operations and division combat

power. It will focus on heavy division operations on a mid- to high- intensity battlefield against a Warsaw Pact threat.

First, it will address the doctrinal implications for sustaining operations on this battlefield. What role does CSS play in division operations? Why is the emphasis on forward support? How is this emphasis applied through the key sustainment functions to enhance tactical efforts and maintain combat effectiveness.?

Next the monograph will briefly overview the Soviet approach to tactical sustainment and the maintenance of combat power. Occasionally, where instructive, comparisons between Soviet and U.S. doctrine will be made. The Soviets also picture combat that is nonlinear, fast moving, and highly lethal. However, the resources at their disposal and their subsequent organization and doctrine for sustainment differ from the U.S. Army's. This sustainment philosophy is firmly rooted in their concept of warfighting and is highly compatible with their tactical, operational and strategic offensive doctrine.

Finally, the monograph will evaluate CSS operations in terms of the Wass de Czege Combat Power Model. This model recognizes the dynamic nature of combat. It accepts that friendly, as well as enemy, activity can yield a net degradation in tactical efficiency. In this regard it assumes that sustainment efforts to enhance tactical operations come at a cost. The model does not provide solutions to the dilemmas of tactical sustainment. Instead it encourages (among other things) rigorous evaluation of

cost and benefit in support operations. More importantly, it underscores that tactical efforts are not separate from logistics efforts; on the contrary, proper integration of both is essential to the successful tactical plan.

Throughout, the monograph will focus on the sustainment requirements and resources that come to bear on heavy division operations. Ultimately, the intent is to determine whether the forward thrust of sustainment in a heavy division represents an asset or a liability to the development and maintenance of division combat power.

OVERVIEW OF CURRENT U.S. SUSTAINMENT DOCTRINE:

FM 63-2-2 (Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions) states that the chief measure of CSS effectiveness is the percentage of weapons systems fully operable on the battlefield." This is a particularly narrow view with more universal application to peacetime readiness than battlefield dynamics. But, it does provide a good departure point.

What value is CSS to the force and why is there emphasis on getting it as far forward as possible? The Heavy Division represents a combined arms capability composed of many smaller organizations. These organizations in turn boast an increasingly complex array of sophisticated systems. Each system possesses a particular capability contributing to success on the battlefield. Most simply stated each system represents equipment with particular

performance capability and soldiers with particular skills. Fully operable (as in the statement above) would mean equipment fully manned, armed, fueled and capable of performing its intended mission. This is ideal. In combat, however, several factors operate to degrade this ideal. They are consumption, failure, damage, and destruction.

Heavy Divisions are great consumers. Daily operations use up large quantities of supplies. To perform properly, the division must replace these supplies as they are used. Failure to replace critical supplies, such as fuel and ammunition, soon renders a system useless.

Failure rates also degrade weapon system availability. Even with proper operator preventive maintenance equipment will fail. The U.S. Army spends great effort and resources in peacetime to meet operational readiness goals without enemy activity or the continued inconvenience of austere field operating conditions. These types of equipment failures will surely continue with intense usage in combat.

Likewise, despite preventive medicine, field hygiene, and proper equipment and clothing, non-battle casualties will still occur. Battlefield fatigue will probably also appear. Consequently, even short of enemy weapons effects, some division systems will be unavailable to perform their mission.

Systems lost through battle damage or destruction should also be significant. The Warsaw Pact possesses high quality weapons whose range and lethality equal or exceed that of the United States. U.S. forces will not be

immune to battle losses.

The conclusion is obvious. The Division will experience erosion of its weapons systems effectiveness. Accordingly, the combat potential of the division will diminish. Effective leadership, training, execution, and supply discipline will mitigate some of this degradation. It will not eliminate it.

Facing this, there are three ways to overcome this loss of combat potential. They are unit replacement, reconstitution, and sustainment.

Units that are used up can be replaced with new, fresh organizations. This is ideal during critical moments of a battle when an opportunity may demand immediate infusion of fresh combat power. However, such unit replacement requires a great depth in national resources. The U.S. does not have this kind of depth. In a short violent conflict, fought thousands of miles from home, U.S. forces will not have many uncommitted units to replace destroyed forces. Indeed, current replacement doctrine allows that

"... any unit that enters the theater after hostilities begin may be viewed as a potential replacement unit regardless of previous deployment schedules."

This recognizes the current and potential high demand for replacement units. But, it also anticipates that these units may be drawn down, in the interest of efficiency, to provide individual, crew, and sub-unit fillers and casualty replacements." Consequently, many U.S. units

will probably remain in contact for extended periods of time, often fighting many times their own numbers.

Occasionally, units will suffer such destruction that they become ineffective. These units can no longer continue in battle sustained solely through normal CSS activities. Whether replaced or not, these units require reconstitution.⁶ Reconstitution doctrine is currently in a state of refinement.⁶ It is clear, however, that it encompasses those extraordinary actions, taken by the command, to rebuild the combat effectiveness of shattered formations.⁷

These actions may be as simple as reorganization of existing units, crews, or individuals.⁸ When necessary and resources permit, it may involve massive infusions of personnel and equipment.⁹ At the extreme, this becomes whole unit regeneration and is in fact the unit replacement option discussed above.

Ideally, the U.S. Army seeks to keep committed units sufficiently strong to operate effectively. The division accomplishes this through normal sustainment operations.¹⁰ These combat service support efforts continually replace combat potential in the division as it erodes through battlefield effects. Because sustainment represents the resource depth that most contributes to continued division operations and maintenance of combat effectiveness, it is the principle interest through the remainder of this monograph

In this regard, FM 63-2-2 further states that

"The expected lethality and dynamics of tomorrow's battlefield demand a CSS organization that is capable of maximizing combat time by minimizing operational downtime and evacuation time . . . CSS functions should be performed as far forward as the tactical situation and available resources will permit. . . at or close to the site where the weapon system is located . . . (and) must be continuous, using immediately available assets." "

This is the essence of Division CSS doctrine. It describes clearly how the division must overcome limited depth in resources. Normally, it does not gain depth throughout the force by pushing fresh combat formations forward. Instead, it gains depth by pushing combat service support forward and rebuilding systems forward.

This provides the motivation for the forward thrust of the six key sustainment functions. These functions are fueling, arming, fixing, manning, and transporting the force. Additionally, the sixth function, protecting the sustainment effort, is essential if the first five are to be effective. These involve sustainment operations most critical to immediate and continuous combat operations.

FUEL THE FORCE:

The Heavy Division will consume large amounts of fuel in combat. Replenishment of this fuel must be immediate and continuous if combat operations are to continue uninterrupted. As an example, planning data for a J-series

Mechanized Division anticipates daily consumption of bulk petroleum at 380,000 gallons per day in the defense and 460,000 gallons per day in the offense.¹²

To accommodate this demand, the division operates a high volume fuel system. The support battalions of the DISCOM possess the capacity to store and issue 358,000 gallons of bulk petroleum per day, or less than one day of supply on average for either attack or defense. They can distribute to customer units 553,400 gallons per day. This figure represents two trips a day and assumes 75% availability of fuel dispensing vehicles.¹³ Of course this also assumes a regular supply of fuel into the division.

There is not a lot of room for waste or error. The message is clear. Without proper management of priorities and resources, the division will not meet peak consumption periods such as offensive operations.

This challenge is met with a scheduled resupply concept that emphasizes forward oriented support. Division requirements are based on using unit forecasts of anticipated needs up to 72 hours in the future. These forecasts are passed through several staff levels up to Corps which then routinely pushes fuel into the division. Operations emphasize unit distribution whenever possible. Ultimately, tactical unit tank trucks refuel weapon systems at or as close to their combat positions as the tactical situation will allow.¹⁴

ARM THE FORCE:

The Heavy Division boasts an impressive array of highly lethal combat systems. Success on the battlefield demands that these systems, from individual small arms to sophisticated attack helicopters, remain operational and in the hands of soldiers. Emphasis on preventive maintenance will reduce system failure. Forward oriented repair policies promise to return battle damaged systems to the fight rapidly. In accordance with priorities, destroyed assets will be available through the supply system.

Just as significantly, these combat systems will consume large quantities of ammunition. Planning factors suggest that a J-series Mechanized Division, conducting sustained defensive operations, will consume 2,000 STON of ammunition daily. During sustained offensive operations it will consume 1,500 STON daily.¹⁵ As with fuel, replenishment of ammunition must be immediate and continuous if the division is to be successful.

To meet this challenge, the Heavy Division operates a Class V ammunition system well forward in the combat area. High tonnage, high usage conventional munitions are positioned, using Corps semitrailers, at ammunition transfer points in the division and brigade support areas. The support battalions of the DISCOM can transfer up to 1050 STON per day from these supply points to using unit ammunition trucks.¹⁶ Generally, customers move needed ammunition from these ATPs to the combat systems, at or as close to their fighting positions as the tactical situation

will allow. Occasionally, Corps may throughput selected conventional or special ammunition items directly to the using unit.¹⁷

MAN THE FORCE:

In combat, death, injury, fatigue and nonbattle losses such as accident and disease will take a heavy toll on the division fighting strength. The division must overcome the resulting loss of trained crews and unit cohesion. It must keep its systems manned with highly motivated, highly skilled soldiers. Preserving high standards of performance, individual morale, and unit strength, spirit and cohesion is everyone's job.

But, here also, sustaining operations perform a large role. And again, by doctrine, it performs this personnel service support (PSS) well forward. These PSS efforts fall into two priority levels. The primary functions of strength accounting, casualty reporting, replacement efforts and health services are critical to operations.¹⁸ They are continuous throughout the battle area. During lulls in combat, support emphasis shifts to secondary, soldier-oriented, PSS functions such as pay, chaplain activities, morale support activities, and postal service.¹⁹

Replacements are most critical. Consequently, a principle challenge of sustainment is to assure a continuous flow of fighting men to the battle area.²⁰ This is accomplished through a replacement push system. The

division notifies Corps of expected personnel requirements based on current strength, anticipated casualties, and expected replacement and hospital gains.²¹ Replacements are then pushed into the division, based on higher level priorities, as they become available. Likewise, the division distributes replacements forward as priorities dictate. Doctrine emphasizes that most efficient operations "... send replacements directly where they are needed most in accordance with task force configurations"²² bypassing intermediate stops. They may be sent directly to a subordinate headquarters or used through the weapon system replacement operation (WSRO) process as individual/crew replacements for available equipment items.²³

Health services in the division area are equally forward oriented. Field medical personnel, operating out of battalion aid stations well forward with tactical units, perform immediate first aid and lifesaving care. An extensive ground and air ambulance capability exists to evacuate seriously injured soldiers to a forward medical company in the BSA or out of the division area.²⁴ Casualties expected to return to duty within 96 hours may be held at the medical support company in the DSA.²⁵ This company also provides first line medical support, on an area basis, to units in the DSA as well as a wide array of specialized services to the division as a whole.²⁶

FIX THE FORCE:

As the effects of combat destroy or damage large quantities of equipment systems, the side which can most rapidly recover, repair, and return those systems to the battle will have a clear advantage.²⁷

The Heavy Division operates a comprehensive, forward oriented maintenance and equipment supply system to meet this challenge. Unit maintenance personnel, augmented by specially tailored direct support maintenance teams, will repair and return damaged equipment far forward in the battle area. Ideally, they may repair equipment where it stands, even as the battle continues.²⁸ When this is not possible, equipment is successively recovered then evacuated to back up maintenance points in the division where repair may be possible. Ultimately, if not repaired in a reasonable time, the equipment is passed to Corps and replaced through the supply system as priorities allow. To control this process, the commander establishes repair and evacuation guidelines as the tactical situation dictates. Rather than evacuate equipment, the commander can push forward additional division and even corps maintenance teams, as well as increased quantities of replacement parts. Whatever the maintenance plan, the ultimate intent is to return systems as rapidly as possible to the battle.²⁹

TRANSPORT THE FORCE

Current doctrine for AirLand battle stresses the

integration of maneuver and firepower. Outnumbered, the United States cannot expect to win positional battles. The heavy division must often move long distances and concentrate rapidly to bring decisive fires on the enemy. Sustaining resources must also concentrate in and around the battle area, as battles progress, to ensure adequate and responsive support. These CSS elements of the heavy division are not 100% mobile. But, division level operations, incorporating movement, remain supportable.³⁰

Successful execution of large division moves requires detailed planning, coordination and control. To this end, the forward oriented sustainment philosophy enhances planning flexibility by providing mission essential CSS capability at each battalion, brigade, and division levels. Additionally, the division employs dedicated transportation and movement managers to ensure efficient utilization of necessary transport assets and available roadspace.³¹ Proper anticipation, planning, training, and organization for movement provide the speed, agility, and synchronization essential to AirLand battle success.³²

PROTECT THE FORCE:

CSS operations face an extensive threat array and a sophisticated threat doctrine that sees destruction or disruption of enemy sustainment as one of the easiest ways to success in future battle.³³

If CSS operations are to sustain the division properly

in combat, they must survive this threat. The division uses both passive and active measures, in combination, to protect sustainment operations.

First, passive measures inhibit enemy acquisition of CSS activities and limit losses if found and engaged. Emphasis on countersurveillance will frustrate enemy detection efforts.³⁴ Additionally, to enhance robustness, doctrine emphasizes dispersion of CSS activities in width and depth throughout the division area.³⁵ Although dispersed, base cluster defensive plans and local security operations provide mutual support to detect and defeat enemy threats.³⁶ Continuous route reconnaissance and convoy security operations between base clusters and supported units intend to limit LOC interdiction.³⁷ Finally, special rear area operation cells (RAOC) coordinate defensive preparations and ensure cooperation in local defense and overall conduct of the rear battle.³⁸

Anticipating attack, CSS units train to defeat the threat locally using individual small arms and crew served weapons. When necessary, the division augments rear battle efforts with indirect fires, air attack, or ground combat forces.³⁹

OVERVIEW OF SOVIET SUSTAINMENT DOCTRINE:

Before proceeding with the analysis of U.S. sustainment doctrine, it is instructive to view briefly the Soviet approach to this essential battlefield requirement.

After all, the Soviets, hope to discover the nature of the same mid- to high-intensity battlefield that U.S. planners seek to understand. In their commitment to meticulous planning for military operations, they have not overlooked the essential requirement to sustain their forces through a wide range of wartime contingencies.⁴⁰

Comparisons of Soviet and U.S. logistics structures have led to the incorrect view that the Soviet plan is inadequate to support their combat forces. On the contrary, the Soviets field a broad-based, modern, and highly mechanized logistics support system.⁴¹ This system possesses the depth, mobility, and responsiveness specifically suited to their concept of offensive operations. Also, correctly perceiving the U.S.-NATO predilection for deep strike, they now field a logistics system sufficiently redundant to ensure continuous support in the face of successful enemy interdiction.⁴²

The Soviet approach to sustaining combat power is firmly rooted in their concept of waging and winning wars. They believe that victory must be swift, if they are to win at all. They cannot afford to allow the combined industrial weight of Western democracies to be mobilized against them.⁴³ Avid students of military history, they learned well the lessons of Germany's succesful Blitzkrieg tactics during WW II. Although detailed analysis of these lessons is not appropriate to this space, three elements do emerge that have significant implications for the Soviet view of combat sustainment.

First, speed is essential in all operations. Soviet forces must occupy territory quickly, and fight and defeat enemy forces as they go. Speed disrupts the ability of the enemy to mount an effective and cohesive defense. It also means that fewer combat units are used and less supplies and systems are lost in securing victory. Consequently, logistics requirements to sustain operations significantly diminish.⁴⁴ Of course, strategic surprise, control of the air, and manageable depth of objectives is essential if smaller forces are to achieve sufficient speed and continued success necessary for rapid victory.⁴⁵ These conditions are conceivably attainable by the Soviets.

Second, in order to sustain the tempo of offensive operations, the Soviets must maintain sufficient combat power to ensure successive victories.⁴⁶ Continuous supply of fuel and ammunition to the fighting elements is essential. Expeditious repair of damaged equipment and rapid treatment of casualties will return lost systems quickly to the fight. The logistics structure that guarantees this responsive support must be as mobile as the fighting elements.

Finally, the Soviets recognize that combat power sustainment is a coin with two sides. As they continually replace lost systems and supplies and maneuver follow-on forces to points of greatest need, they must also inhibit the enemy's ability to do the same. They learned in WW II that early German success was in great part attributed to extensive use of air power, desant forces and fifth column

operations designed to control communication centers and LOCs as well as disrupt defensive preparations.¹¹ Later in the war, Soviet special purpose forces (SPF) operating in the German rear areas significantly contributed to Germany's defeat.

Today, the Soviets believe that the easiest way to defeat the enemy is to destroy the command and control (especially nuclear) and logistic systems that combat units depend on for their effectiveness.¹² They possess a wide array of air attack, desant, ground mobile, and special purpose forces to accomplish this end. Although clearly they anticipate employing these elements out to operational and strategic depth of NATO defenses, the heavy division can still expect this activity in its tactical rear.

The Soviet Union now fields a tactical sustainment system, specifically designed to be more survivable and more capable of sustained support to the high speed maneuver combat anticipated on future battlefields.¹³

Like the United States, the Soviets field tailored logistical support elements to every tactical command level from company to division.¹⁴ Unlike those in the U.S. heavy division, these elements are all 100% mobile.¹⁵ In a Soviet tank or motorized rifle division, this includes an impressive three to five day supply of mobile fuel. This is sufficient to refuel their units twice.¹⁶

Additionally, Soviet logistics doctrine urges forward oriented, immediate, and continuous support to fighting elements.¹⁷ However, again unlike the U.S., all

resupply is unit resupply. Necessary sustaining resources are pushed forward to lower echelons, often bypassing intermediate levels.⁵⁴ This emphasis on forward delivery enhances support operations of units in contact. In this regard, fighting divisions do not have to support themselves. Instead, they receive supplies pushed from Front or Army as necessary to influence the battle.⁵⁵ Consequently, organic supplies are husbanded. This gives divisions depth and staying power essential to success once the unit is isolated on the non-linear battlefield.⁵⁶

Soviet plans for maintaining combat effectiveness in the face of lost systems (people and equipment) is equally compatible with the desire for high speed offensive operations. They operate tactical observation points (TOP) that monitor the battlefield for damage and direct repair and evacuation groups (REG) forward. The battle moves on as these units perform repairs. A primary goal of this process is to clear damage from major avenues of approach of follow-on combat units.⁵⁷

Additionally, Soviet field medical support is equally responsive and deployed well forward to provide immediate care to battlefield casualties.⁵⁸ Soviet techniques in this area are far from primitive. In WW II German commanders were continually amazed at the ability of "destroyed" Soviet units to reappear in the order of battle within 3 days.⁵⁹

However, regardless of detailed preparations for sustainment of combat effectiveness, the Soviets expect

extensive damage to some units. They will accept losses in some units in order to generate momentum that promotes overall success and reduces aggregate losses and support requirements.⁶⁰ They possess a depth of fresh forces which permit them to replace shattered formations. These replaced units are then rebuilt with systems previously policed from the battlefield and repaired.⁶¹

EVALUATION OF U.S. SUSTAINMENT DOCTRINE IN THE CONTEXT OF COMBAT POWER:

Clearly, there is merit for forward momentum of sustainment operations. In fact, no clear alternative exists. The U.S. does not possess a depth of many fresh units. Therefore, divisions must keep committed units strong.

But, sustainment operations do not exist in a vacuum. Commanders cannot afford the almost cavalier attitude of 63-2-2 when it states:

"CSS units must be effective regardless of the tactical situation. This effectiveness is vital to success on the battlefield. CSS elements must provide support as far forward as the tactical situation will permit. They must move personnel and materials forward to the fighters. They must ensure that support is properly protected, efficiently sited, and effectively managed".⁶²

Caveats notwithstanding, there is a disconnect here.

A highly lethal, fast-moving battlefield will degrade weapon systems specifically designed to operate and survive in it. Can the support structure go where these units go on

time and with enough resources? Can it get close enough to do what becomes necessary and survive the battlefield effects? Will it sufficiently degrade erosion of combat power?

The support forward philosophy should not blind commanders to the realities of this battlefield. As CSS elements operate as far forward as the tactical situation will permit, they are not just providing sustainment to the fighters. Instead they are an integral part of the force. They do not operate regardless of the tactical situation but instead bring with them certain assets and liabilities that also define the tactical situation.

Commanders must strike a balance in CSS operations. They must ensure that tactical plans reflect the limitations of their sustainment system as they endeavor to exploit its capabilities.⁶³ They must optimize available resource depth in support of the current battle.

In this context, FM 100-5 paints a more realistic expectation of combat service support when it says

"The sole measurement of sustainment success has always been the generation of combat power at the decisive time and place."⁶⁴

Here, CSS operations become an integral part of the tactical plan. Consequently, they are an ever present consideration in the dynamics of combat power.

FM 100-5 defines combat power as

"...the ability to fight. It measures the effect created by combining maneuver, firepower, protection, and leadership in combat actions against an enemy in war."¹³

Just as commanders combine the elements of combat power in proper combination appropriate to the situation to defeat the enemy, they must also interfere with the enemy efforts to do the same. There is a dynamic tension here as inherent capabilities, positive action and environmental effects influence each adversary against the other and thus the outcome of the battle or engagement.

Sustaining depth quickly gets involved in this dynamic.

"Therefore, while quantitative measures of available capability are important, the quality of available capabilities, the ability of the leader to bring them to bear, and the ability of the leader to avoid the enemy's efforts to degrade his own capabilities before or during battle may be equally or more important. This explains why the larger or stronger force does not always win."¹⁴

It also explains why units can't presume to redress existing numerical disadvantage by trying to 'maximize' operable weapons systems through sustainment operations well forward in the most lethal area of the combat zone. What is tactically ideal may not be possible if the threat to the sustainment system, or that systems inherent limitations, outweigh any benefit to the tactical plan. Where that plan depends on sustainment, it fails. The leader must consider these possibilities and he must find a better combination of maneuver, firepower, and protection

effects.

This seems an awful burden for the commander who sets out to kill enemy tanks and then must also consider how well he can fix his own. Of course this is not the message. But, it is not altogether unreasonable. Why?

In his paper "Dynamics of Combat Power", Col. Huba Wass De Czege elaborates on an analytical framework useful for evaluating relative combat power. He suggests that leaders begin with certain capabilities in their organization to move, shoot, and achieve protection. How they use this capability results in maneuver effects, firepower effects, and protection effects. The leader's actions not only enhance or degrade the actions of the enemy, but also increase or decrease his own capabilities.⁶⁷ This creates the dynamic tension referenced earlier and yields the relative combat power of the antagonists.

Wass De Czege does not promise magic solutions to an unknown, but clearly complex, future battlefield. In fact, his model may be more an efficient tool for battle analysis than for tactical planning or decision making. But, that is only because battle is fraught with chance and many variables that cannot be quantified. The important message in the model is that the able leader considers the possible and plans accordingly. Sometimes he takes risk, but he does not risk blindly.

This endorses current logistics doctrine which recommends thorough risk-benefit analysis before designing

the logistic support plan.²² But, that logistic support plan, despite risk-benefit analysis, may not always emerge as a requisite appendage to the tactical plan. Worse, the popular aphorism that 'the logistician draws the line beyond which the tactician can not cross' may prove too little good advice too late.

Consider again the commander who wants to kill enemy tanks. He may suspect that success depends on fixing his own damaged tanks. He may believe that support forward doctrine will get his tanks fixed in combat, at or near their battle positions. But, it may also get his maintenance teams, in soft vehicles or unprotected work areas destroyed. Worse, the tanks may not get repaired. He should have a feel for this. But, on the eve of the battle it may be too late.

In this regard, Wass De Czege also explains that "prior to battle, leaders set the preconditions which make winning possible. Superior combat power has its roots in proper preparation."²³ This is not shocking news. But, it does suggest that there are tough questions the commander can ask about his CSS concepts that may avoid disasters in the next first battle. Then, armed with that battle experience, the division can continue to train and adjust to reality as it finds it.

Additionally, the model accepts that many variables cannot be changed. The commander does not easily alter organization and equipment design. He must work within these constraints.

Ultimately, the commander must confront the issues and make some tough decisions. How should the division commander evaluate sustainment effect on his combat power dynamics? Will the Heavy Division sustainment system be an asset or a liability in combat? Clearly, the answer to these questions depends on how the commander sees the battle and how he intends to fight it. It depends on what he must have from his sustainment system, and what it must cost him, if anything, to get it. Finally, it depends on how he has prepared his division, in the context of sustainment potential, to ensure success.

The combat power model is an excellent tool for conducting this evaluation. Although not a complete roadmap, it points the direction to the types of problems the commander must confront. Following is an analysis of the types of sustainment issues that may impact on a division's combat power dynamics. This is not intended as a formula to evaluate every sustainment challenge facing each division. Nor are suggested commander actions intended as prescriptive solutions. The analysis will orient on maneuver and firepower effects. Leadership and protection effects impact throughout the discussion of both and will become obvious.

MANEUVER EFFECTS:

Maneuver is essential if the commander is to engage the enemy at a time and place that maximizes his firepower while minimizing that of the enemy.²⁰ In essence, the

systems of the division must be able to move, while maintaining sufficient combined arms integrity to serve the commander's plan. Wass De Czege posits several functions of the maneuver effect. Two of these, unit mobility and effective management of resources, are significantly influenced by sustainment efforts. Unit mobility is influenced by equipment capability, equipment availability, and unit mobility skills.²¹

The commander cannot affect the performance characteristics of the equipment assigned to the division. However, he can and must consider the characteristics of each system as it affects another. Ideally, CSS systems must move as fast as necessary over all terrain, in all weather to support on time. In a fast moving situation or, when operating close to contact away from improved roads, this is not always possible. In such a case, support is not immediate and continuous. The alternative to this is that combat unit mobility is degraded to allow for the speed, trafficability, and survivability of requisite CSS systems.²²

Unfortunately, the performance gap between sustainment systems and combat systems is widening. Present generation fighting vehicles, such as the M1 and M2 achieve increased firepower, armor protection, and mobility over their predecessors.²³ They enhance speed and agility by moving highly lethal weapons, faster over greater distance to engage the enemy. At first glance, these are powerful assets to the division firepower and maneuver effects. But,

unfortunately, these systems also promise to consume more fuel and ammunition at faster rates than before. To optimize performance they require resupply, more frequently, in a shorter period of time and in closer proximity to the fight.⁷⁴

Current ammunition and fuel resupply systems do not meet this requirement. Even the newest tactical trucks lack the mobility to follow tracked vehicles over soft earth and sand.⁷⁵ Often ruts, made by tracks, will significantly slow if not stop resupply efforts. Additionally, these thin skinned vehicles are vulnerable to almost every weapon from a .22 caliber and up.⁷⁶ Long-term survivability, especially in a non-linear battlefield, is not optimistic.

The Army recognizes this deficiency. Consequently, a family of armored, tracked, close support vehicles is being developed for fielding to heavy divisions.⁷⁷ These vehicles will mitigate not only trafficability problems, but also survivability problems.

In the meantime, the heavy division still has a problem and should consider this in tactical planning. When speed over broken terrain or in close enemy contact is essential, the commander cannot have fuel and ammunition tucked in close to his combat formations. Resupply must have the routes and the time to stage forward. Additionally, rearming and refueling must take place generally at night, well behind the battle position.⁷⁸ This "service station" method of replenishment requires lulls in the battle or rotating systems or subunits out of

contact. Consequently, speed and agility in the face of opportunity may well be hostage to the on-board fuel and ammunition loads of committed systems. Worse, the enemy may not cooperate when resupply needs reach critical stages. Ultimately, the dramatic value of new generation combat systems to maneuver and firepower effects is only as great as the weakness in the logistics tail.

Fuel management practices threaten to endanger operations further. The U.S. simply does not train well to manage fuel in combat. Although forward thrust of scheduled resupply is anticipated in current doctrine, it is not well understood or practiced by most units. Too much reliance is placed the unit forecasts passed through a series of staff agencies. If communication is lost on the battlefield, as it most likely will be, the system may break down.

The combat power model requires that the able commander recognize these constraints. As he fights the battle, he must also manage his resources and plan replenishment opportunities. He fails to do so at his peril.

Closely related to this issue is how the commander manages his total sustainment system as he propels the awesome weight of a Heavy Division around the battlefield. In a fast paced battlefield CSS units must move, support and sometimes move while supporting.

Unfortunately, by their nature, CSS units do not perform well while moving. This is more than simply a problem of movement skills. Although unit resupply is

'off the truck', supply points must still be established in the rear areas. In addition, maintenance and medical activities, as well as other field services, must support from semi-fixed locations.

The division cannot move its entire sustainment package at one time. First, it does not have tractors and drivers for each of its trailers. Second, it must often sustain while it moves. Consequently, long movements are performed in successive lifts. This takes time. As an example, one senior logistician estimates that to draw down and displace a fuel point 40 km, then return it to operation and service customers would take 12-24 hours.⁹¹ In a controlled, linear battlefield, or when conducting division level marches out of contact, this may not present a problem.⁹²

But, in a fast moving, non-linear battlefield, some tough choices must be made. If the Soviets accomplish anything near their advance norms of 30-40 kilometers per day⁹³ they will cover a distance that reaches from the FEBR almost to the DSA.⁹⁴ In such an event, CSS assets would often remain mobile. Considerable capability would be out of supporting distance and many supplies, as well as damaged equipment, would be left behind.

The commander simply can't have it all and he can't always have it now. He must set priorities. But, he can improve his options with proper anticipation, planning, and training. First, he can insist that leaders at all levels decide what is absolutely necessary in battle. Leave the

rest home! Additionally, he can make sure that non-combat essential peacetime requirements are not cluttering up the supply pipeline at higher echelons.³⁵ This will not only get him more responsive support, but may also free up Corps fleet assets to assist with his lift problems. Finally, the commander can reduce the fleet asset shortfall by enhancing the survivability of his systems. Proper training and supervision will overcome some of this hazard. Unfortunately, the commander may still have to rein in the forward thrust of some sustainment requirements, if the potential threat to CSS assets would place unacceptable constraints on future options.

Unit mobility is next a function of equipment maintenance and availability.³⁶ Intense usage and enemy firepower will create significant equipment losses through failure, damage, and destruction. Rapid repair and return, close to the fight, will substantially enhance the commander's options for today's or the next day's battle. In this regard FC 101-5-2 anticipates that up to 80% of Main Battle Tank reparable losses can be returned inside the division at an average repair time of ten manhours.³⁷ This is ideal planning data. But, potential problems exist with the fix forward concept which may upset this ideal. The commander must consider these.

First, the repair system may not function properly. Although the Army places increased emphasis on its fix-forward philosophy, it is still not an exact science. Fix-forward requires more than just putting maintenance

teams far forward in the battle area. Those teams are also part of a system. To be successful, they must have proper diagnostic equipment and skills, a correct array of repair and replacement parts and proven techniques for expedient repair.²² The commander may suspect he can rebuild battle fleets in the division area, but his maintenance system and training are based on predictive models and peacetime experience at best.

The same philosophy which drives the maintenance mission in garrison will not serve well in combat. That is why maintenance doctrine for battle emphasizes mission essential maintenance operations (MEMO) standards of repair and liberlized cannibalization.²³

But, field expedient repair impacts on the whole combat damage repair discipline.²⁴ Repair part stocks, diagnostic habits, and soldier performance standards may not translate well from the motor pool to the battle position. As he rushes to meet unit readiness goals in peacetime, the commander should consider that he is not necessarily preparing his maintenance system to perform its wartime mission. If he than suspects a problem, he should train accordingly.

Still, even if the repair system functions properly, the tempo of battle may frustrate its value to the force. Doctrine allows that maintenance teams must have time to perform their job. Established repair time guidelines for maintenance assets in a defensive scenario are as follows:

- a) at the breakdown site, repair or recover in two hrs.,

b) at the battalion/TF trains, repair or recover in four to six hrs., c) in the BSA repair or evacuate in 24 hrs., d) in the DSA, repair or evacuate in 36 hrs.²¹ This does not include recovery or evacuation time. Such limits appear arbitrary on a fluid battlefield. Of course they require adjustment to reflect workloads, resources, and the true pace of combat. Unfortunately, this may require wisdom grown through bitter lessons in the first battle.

In practice, maintenance teams may find the battle outdistancing them. Worse, they may be overrun as they perform their mission. Heavy lift assets necessary to move repaired systems forward to the battle or, more importantly, evacuate them out of danger may become overtasked.

Consider that the Soviets believe they can repair 80% of battle damaged equipment in less than three days. Maintenance workshops, from regiment to front, will follow attacking forces and rapidly return equipment to use. This will be done largely after the battle. To make this possible, Soviet forces expect to be advancing and are confident that they will own the battlefield. In turn, they expect to deny this advantage to their adversary.²² If they are correct, then the U.S. commander who places great value on his fix forward system could face a serious dilemma.

Finally, the commander must carefully judge his maintenance priorities. As he sets priorities for evacuation, repair and issue, he must resist a temptation

to think only of combat systems. In many situations, timely emphasis on sustainment or command and control systems may yield higher aggregate capability to his entire force. This should appear obvious. Combat systems depend on sustainment to remain fueled, armed, and operational. They depend on command and control to get to the right place at the right time on the battlefield. As failure, damage, and destruction takes its toll on sustainment and C2 systems, the commander must at some time give them repair priority simply because of the combat systems that rely on them.

FIREPOWER EFFECTS:

Firepower effects are a function of several variables: the volume of fire, the lethality of each munition, the accuracy of delivery means, target acquisition capability, and the flexibility of employment.

Firepower is the fundamental focus of the combat power model. Success for the Heavy Division demands efficient destruction of enemy formations. Consequently, all other effects are intimately tied to inflicting damage through firepower. This does not necessarily mean maximum firepower or even superior firepower (in terms of total rounds). Quality, not quantity, will decide engagements. Consequently, firepower must rest in balance with all other combat power effects. Accordingly, CSS contributions to the firepower effect must be optimized, not only in support of any current engagement, but for the greater success of the battle. Again, the commander simply can't have it all.

Tough choices must be made.

Acquisition, accuracy, volume of fire, and flexibility of employment are all functions of equipment and crew capability. First, to a large degree, the commander is dependent on the design characteristics of the weapon. He can do little about this. Next, this is a function of the number of delivery systems employed. The role of the sustainment system impacts here mainly through maintenance efforts discussed above in maneuver effects. The commander has additional influence in this area by how far forward he pushes expensive and limited quantities of replacement optics and computers, as well as unique repair skills of specially trained mechanics. The farther forward he places these components and trained personnel he trades faster turn around time to one system for greater risk of loss in sustaining depth to many systems.

Finally, the commander influences these areas greatly through effective training and leadership. Repetitive crew drill and live firing hones the individual, crew, and unit skills necessary to put systems into action, engage the target, and maintain accurate and sustained rates of fire. However, future combat will take a heavy toll on trained crews. Without soldiers to man them, weapon systems become useless. Without healthy, motivated, disciplined soldiers, unit strength and cohesion is torn apart. Just when the commander most needs combat efficiency, battle will disrupt his many months of investment in training and team building.

Replacement operations have dramatic impact here. But

current replacement doctrine aims for administrative efficiency, often at the cost of unit cohesion and enhanced combat power.³⁵

When that doctrine emphasizes pushing replacements as rapidly as possible forward to their gaining battalions³⁶ it repeats the World War II mistake of equating numbers with combat effectiveness.³⁷

Following an extensive series of combat field interviews during WW II, BG S.L.A. Marshall concluded that individual soldiers, entering strange units in combat, were practically worthless in a fight. Although they would initially stay with the unit and move with the unit, invariably they would run at the first sign of dangerous resistance.³⁸ Soldiers needed time to bond themselves to the group, get special training, and grow mutual trust. Martin Van Creveld echoes these sentiments following his extensive research on the subject. He finds that the U.S. WW II policy of pushing individual replacements forward to keep up the strength of units remaining in contact in fact disrupted unit cohesion.³⁹

Commanders should heed these warnings. Of course they cannot dismiss the entire personnel replacement system. But they need not participate in a tradition, little changed,⁴⁰ which Marshall indicts as "... fillers of holes rather than architects of the human spirit."⁴¹

Commanders can influence action in their own units. However, they may need to establish the structure and

procedures to do this. Commanders can ask themselves if they now, in garrison, build the organizational ethos and individual skills that will promote proper reception and assimilation in combat. Do their Field SOPs contain the procedures that will quickly grow crew integrity and enhance, not degrade, unit cohesion on the battlefield? When they need soldiers in the foxhole, will they instead spend the time to bond them into lethal and synergistic systems? If not, than perhaps the best efforts of sustaining resources to move replacements in the division may have a null, if not detrimental, effect on combat power.

Third, volume of fire is a function of the class V supply system. The sustainment system must put a sufficient quantity and quality of many different munitions for many different systems where and when they are needed. This effort currently involves a large storage, handling and distribution effort well forward, semi-mobile, and highly vulnerable. Management practices are in place that will relieve strain on the system. Judicious use of appropriate rounds for desired target effects will reduce waste. Controlled supply rates will help direct priorities and help preserve operating levels of critical munitions that are insufficiently stocked in the system.

Still, the commander's combat power equation is vulnerable in this area. Aside from the soft-skinned resupply vehicles mentioned earlier the ATP, operating in the brigade rear, is also a lucrative and vulnerable

prize. If located, it can be targeted by a wide array of threat ground, air, and indirect fire systems. Once lost, these assets are not easily replaced.

SUMMARY AND CONCLUSIONS:

Mid- to high- intensity warfare against a Soviet threat will most likely find the U.S. heavy division fighting outnumbered for extended periods of time. This combat will be highly destructive. The combatants will consume large quantities of supplies and they will lose large quantities of fighting and support systems. To remain in battle, the heavy division must replace these supplies and systems as they are lost.

Army doctrine relies heavily on sustaining operations to keep divisions strong and in the fight. Anticipating the rapid pace of future combat, logistics doctrine demands that CSS maximize the combat time of committed units by performing sustaining efforts as far forward as possible. Sustainment must be immediate and continuous.

The heavy division faces a sophisticated Soviet threat. This threat also plans forward oriented, immediate and continuous sustaining operations. Whereas the Soviets can influence the outcome of battle with fresh follow-on forces; the U.S. commander cannot depend on this luxury.

Essentially, the U.S. heavy division must destroy threat formations faster and replace critical supplies and lost systems with greater efficiency than the Soviet

adversary. To be successful, it must continually generate superior combat power at the right place and the right time.

The combat power model points out that the generation of combat power is a complex and dynamic equation. As the heavy division commander combines the maneuver and firepower potential of his division to achieve superior combat power, he must also protect himself from enemy efforts to do the same. Additionally, as he attempts to utilize the strengths of his organization, he must also consider its inherent weaknesses. This is no less so for sustainment.

Sustainment operations come at a cost. They bring at once both capabilities and limitations to the division combat potential. Many examples have already been given where they can both enhance and degrade the division capacity to move, shoot, and achieve protection.

Thus, sustainment operations are an inescapable function in the combat power dynamics. Often, they represent a decisive element in the outcome of battle. More than simply a part of the force, CSS efforts represent the resource depth that is the combat potential the commander needs to finish the fight today or achieve victory tomorrow. Consequently, as with all systems in the division, the commander must consider the capabilities and limitations of CSS efforts in the design of any successful tactical plan.

The commander cannot become trapped by the siren's song of logistics doctrine. True, this doctrine makes

occasional references to the hazards of the battlefield and the limitations of sustainment. But these subtle disclaimers notwithstanding, it is still imbued with the spirit that "CSS units must be successful regardless of the tactical situation."¹⁰²

This does not relieve the commander of responsibility for sustainment operations. As with any other element of the command, combat service support units bring a given capability to the division. But, on the eve of battle, true combat potential will also reflect the foresight and effort the commander has invested in these units.

The able commander will prepare and train to enhance the strengths and reduce the limitations that CSS efforts place on his options. Only he can arbitrate between the forward oriented support philosophy, the capability of his unit, and the reality of the battlefield he anticipates.

Ultimately, in battle, CSS efforts will find their impact in the commander's plan. He decides, by his preparation and decisions, whether the forward thrust of sustainment in a heavy division represents an asset or a liability to the development and maintenance of division combat power.

ENDNOTES

1. U.S. Army Field Manual 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, (Washington DC, August 1985), p. 2-2.
2. U.S. Army Field Manual 100-5, Operations, (Washington, DC, May 1986), p. 3.
3. U.S. Army Field Manual 12-16, Replacement Operations, (Washington, DC, July 1984), p. 1-3.
4. Ibid., pp. 1-2 to 1-3.
5. FM 100-5, Operations, p. 55.
6. Curtis N. Marsh III, "Reconstitution", Military Review, (January 1987), p. 57.
7. TRADOC Pamphlet 525-51, U.S. Army Operational Concept for Reconstitution on the AirLand Battlefield, (Fort Monroe, VA, April 1986), p. 2.
8. Ibid., p. 4.
9. Ibid., p. 5.
10. FM 100-5, Operations, p. 59.
11. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p. 2-2 to 2-3.
12. Student Text 101-6, G-4 Battle Book, (Fort Leavenworth, KS, June 1987), p. 2-3.
13. Student Text 101-1, Organizational and Tactical Reference Data for the Army in the Field, (Fort Leavenworth, KS, June 1986), pp. 6-15 and 6-31.
14. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, pp. 5-9 to 5-10.
15. ST 101-6, G-4 Battle Book, p. 2-4.
16. ST 101-1, Organizational and Tactical Reference Data for the Army in the Field, pp. 6-15 and 6-31.
17. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p. 5-11.
18. Ibid., p. 9-2.
19. Ibid., p. 9-2.
20. FM 100-5, Operations, p. 60.

21. Student Text 63-1, Fundamentals of Combat Service Support, (Fort Leavenworth, KS, May 1986), p. 1-5.
22. FM 12-16, Replacement Operations, p. 3-5.
23. Ibid., p. 4-4.
24. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, pp. 10-2 and 10-3.
25. Ibid., p. 10-5.
26. Ibid., pp. 10-3 and 10-4.
27. FM 100-5, Operations, p. 61.
28. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p. 6-2.
29. Ibid., pp. 6-2 to 6-6.
30. L.D. Holder and Edwin J. Arnold, Tactical Movement of the Heavy Division, (Unpublished, June 1987), p. 2.
31. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, pp. 7-2 to 7-5.
32. Holder and Arnold, Movement of the Heavy Division, p. 3.
33. Interview with LTC Lester W. Grau, Chief of Soviet Branch, CTAC, U.S. Army Command and General Staff College, Ft. Leavenworth, KS. 25 January 1988.
34. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p. 1-10.
35. Field Manual 90-14, Rear Battle, (Washington, DC, June 1985), p. 2-2.
36. Ibid., p. 2-3.
37. Ibid., p. C-1 and C-2.
38. Ibid., p. 5-2.
39. Ibid., p. 5-2.
40. Soviet Military Power, (Washington DC, March 1987), pp. 95-96.
41. FM 100-2-2, The Soviet Army: Specialized Warfare and Rear Area Support, (Washington, DC, July 1984), p. 13-1.
42. Soviet Military Power, p. 100.

43. P. H. Vigor, Soviet Blitzkrieg Theory, (New York, NY, 1983), p. 2.
44. Ibid., p. 187.
45. Ibid., pp. 188-189.
46. Ibid., p. 96.
47. Ibid., pp. 98-100.
48. Interview with LTC Lester W. Grau.
49. Soviet Military Power, p. 100.
50. FM 100-2-2, The Soviet Army: Specialized Warfare and Rear Area Support, p. 13-6.
51. Ibid., p. 13-4.
52. Ibid., p. 13-10.
53. Ibid., p. 13-1.
54. Ibid., p. 13-12.
55. Ibid., 13-14.
56. Soviet Military Power, p. 101.
57. FM 100-2-2, The Soviet Army: Specialized Warfare and Rear Area Support, p. 13-17.
58. Ibid., p. 13-18.
59. Richard F. Timmons, "Lessons From the Past for NATO", Parameters, (Volume XIV, NO 3, Autumn 1984), p. 4.
60. Interview with LTC Lester W. Grau.
61. Ibid., p. 5-61.
62. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p. 2-2.
63. FM 100-5, Operations, p. 71.
64. Ibid., p. 60.
65. Ibid., p. 11.
66. Ibid., p. 11.
67. Huba Wass de Czege, Understanding and Developing Combat Power, (unpublished, 1984, p. 10.

68. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p. 2-5.
69. Wass de Czege, Understanding and Developing Combat Power, p. 10.
70. Ibid., p. 11.
71. Ibid., p. 22.
72. Armor Conference White Paper, "Combat Service Support-At War", Armor, (July-August 1984), p.32.
73. David C. Holliday, "Resupplying Armor the FASTARM Way", Armor, (July-August 1984), p.12.
74. Ibid., p. 12.
75. Ibid., p. 12.
76. Armor Conference White Paper, p. 34.
77. Neil Munro, "Frontline Supply Operations", National Defense, (May-June 1987), pp. 84-87.
78. Armor Conference White Paper, p. 32.
79. David F. Tosch, Sustaining Tactical Maneuver on the AirLand Battlefield: Will the Current Support Concept for Supplying Fuel Provide the Means?, (Fort Leavenworth, KS, 1986), p.35.
80. Ibid., p. 34.
81. MG Albin Wheeler as cited by James Kitfield and James Russell, "Can Trucks Keep Up With Army Doctrine", Military Logistics Forum, (Volume 2, No. 9, June 1986), pp. 50-51.
82. Holder and Arnold, Movement of the Heavy Division, p.2.
83. Interview with LTC Lester W. Grau.
84. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p. 3-8.
85. John R. Galvin, "The VII Corps Commander Views Grass Roots Logistics", Army Logistician, (July-August 1984), p.5.
86. Wass de Czege, Understanding and Developing Combat Power, p. 22.
87. Field Circular 101-5-2, Staff Officer's Handbook, (Fort Leavenworth, KS, March 1987), p. 7-43.
88. Douglas J. Hackenbruch, "Fixing Forward Needs Fixing", Army Logistician, (November-December 1982), pp. 29-31.

89. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p. 6-6.
90. Hackenbruch, "Fixing Forward Needs Fixing", p. 31.
91. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p.6-6.
92. Interview with LTC Lester W. Grau.
93. Vass de Czege, Understanding and Developing Combat Power, p. 19.
94. FM 100-5, Operations, p. 11.
95. William S. Knightly, The United States Army Wartime Replacement System: Can It Maintain Cohesion in Our Tactical Units?, (Fort Leavenworth, KS, 1986), p. 33.
96. FM 12-16, Replacement Operations, p. 3-5.
97. Knightly, The United States Army Wartime Replacement System: Can It Maintain Cohesion in Our Tactical Units?, p.35.
98. S.L.A. Marshall, Men Against Fire: The Problem of Battle Command in Future War, (Gloucester, MASS, 1978), pp. 151-153.
99. Martin Van Creveld, Fighting Power: German Military Performance, 1914-1945, (Carlisle Barracks, Pa., 1983), p. 54.
100. Knightly, The United States Army Wartime Replacement System: Can It Maintain Cohesion in Our Tactical Units?, p. 33.
101. Marshall, Men Against Fire: The Problem of Battle Command in Future War, p. 156.
102. FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, p. 2-2.

BIBLIOGRAPHY

BOOKS

- Dupuy, Trevor N. The Evolution of Weapons and Warfare. Fairfax, VA: Hero Books, 1984.
- English, John A. On Infantry. New York, NY: Praeger Publishers, 1984.
- Huston, James A. The Sinews of War: Army Logistics 1775-1953. Washington, DC: Office of the Chief of Military History, United States Army, 1966.
- Marshall, S.L.A. Men Against Fire: The Problem of Battle Command in Future War. Gloucester, MASS: Peter Smith, 1978.
- Van Creveld, Martin. Fighting Power: German Military Performance, 1914-1945. Carlisle Barracks, Pa. US Army War College, 1983.
- _____. Supplying War: Logistics From Wallenstein to Patton. New York, NY: Cambridge University Press, 1986.
- Vigor, P.H. Soviet Blitzkrieg Theory. New York, N.Y.: St. Martin's Press, 1983.

GOVERNMENT PUBLICATIONS

- Field Circular 101-5-2, Staff Officer's Handbook. Ft. Leavenworth, KS. U.S. Army Command and General Staff College, March 1987.
- Field Manual 12-16, Replacement Operations. Washington, DC. Headquarters, Department of the Army. July 1984.
- Field Manual 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions. Washington, DC: HQ Department of the Army, 1985.
- Field Manual 63-3J, Combat Service Support Operations-Corps. Washington DC: HQ Department of the Army, 1985.
- Field Manual 63-20, Forward Support Battalion: Armored, Mechanized, and Motorized Divisions. Washington, DC: HQ Department of the Army, 1985.
- Field Manual 90-14, Rear Battle. Washington, DC.: Headquarters, Department of the Army, June 1985.

Field Manual 100-2-2, The Soviet Army: Specialized Warfare and Rear Area Support. Washington, DC: Headquarters, Department of the Army, July 1984.

Field Manual 100-5, Operations. Washington, DC: HQ Department of the Army, 1986.

Field Manual 100-10, Combat Service Support. Washington, DC: HQ Department of the Army, 1983.

Student Text 63-1, Fundamentals of Combat Service Support. Ft Leavenworth, KS: U.S. Army Command and General Staff College, May 1986.

Student Text 101-1, Organizational and Tactical Reference Data For the Army in the Field. Ft. Leavenworth, KS: U.S. Army Command and General Staff College, June 1986.

Student Text 101-6, G-4 Battle Book. Ft. Leavenworth, KS.: U.S. Army Command and General Staff College, June 1987.

Tradoc Pamphlet 525-51, U.S. Army Operational Concept for Reconstitution on the Airland Battlefield. Fort Monroe, VA: HQ Training and Doctrine Command, 1986.

U.S. Department of Defense. Soviet Military Power. Government Printing Office No. 008-000-00464-1, March 1987.

INTERVIEW

Grau, Lester W. LTC, Chief Soviet Branch, CTAC, U.S. Army Command and General Staff College, Ft. Leavenworth, KS. Interview, 25 January 1983.

MANUSCRIPTS

Holder, L.D. and Edwin J. Arnold., Tactical Movement of the Heavy Division. Unpublished, June 1987.

Wass de Czege, Huba, Col. Understanding and Developing Combat Power. Unpublished, 1984.

MONOGRAPHS

Combest, Michael L., Maj. Building the Will to Fight: Prerequisite to Winning the Airland Battle. Fort Leavenworth, KS: School of Advanced Military Studies, 1986.

Knightly, William S., Maj. The United States Army Wartime Replacement System: Can It Maintain Cohesion in our Tactical Units? Fort Leavenworth, KS: School of Advanced Military Studies, 1986.

Rockwell, Christopher, Maj. The Imperatives of Tactical Level Maintenance. Fort Leavenworth, KS: School of Advanced Military Studies, 1986.

Tosch, David F., Maj. Sustaining Tactical Maneuver on the Airland Battlefield: Will the Current Support Concept For Supplying Fuel Provide the Means? Fort Leavenworth, KS: School of Advanced Military Studies, 1986.

PERIODICALS

Armor Conference White Paper. (1983), "Combat Service Support-At War". Armor. July-August 1984.

Curtis, Donald McB., "Give the User What He Wants". Army. April 1957.

Duffy, Michael., "The Coming Truck Shortage". Military Logistics Forum. June 1985.

Freedman, Lawrence., "Logistics and Mobility In Modern Warfare". Armed Forces. February 1986.

Galvin, John R., "The VII Corps Commander Views Grass Roots Logistics". Army Logistician. July-August 1984.

Golushko, I., "Logistical Support In Battle". Soviet Military Review. May 1984.

Hackenbruch, Douglas J., "Fixing Forward Needs Fixing". Army Logistician. November-December 1982.

Hayes, John D., "Logistics of Necessity". Ordnance. January-February 1954.

Holliday, David C., "Resupplying Armor The FASTARM Way". Armor. July-August 1984.

Kitfield, James and James Russell., "Can Trucks Keep Up With Army Doctrine?". Military Logistics Forum. June 1986.

Marsh, Curtis N. III., "Reconstitution". Military Review. January 1987.

Marshall, Rick., "Logistics: Does the Tail Wag the Tiger?". Defense and Foreign Affairs. August-September 1986.

- Munro, Neil., "Frontline Supply Operations".
National Defense. May-June 1987.
- Novikov, M., "Combat Logistics Today".
Soviet Military Review. May 1966.
- Rigg, Robert B., "Do We Need All That Depth?".
Army. June 1971.
- Sims, Lynn L., "Battle Area Logistics in the Future".
Army Logistician. July-August 1983.
- Steinberg, Gerald M., "Israel's Advantage".
Military Logistics Forum. March 1986.
- Stephenson, George M., "Protecting the Brigade Support
Area". Army Logistician. May-June 1983.
- Sullivan, Bloomer D., "Logistical Support for the Airland
Battle". Military Review. February 1984.
- Swofford James E. II., "Fixing Forward in Europe".
Army Logistician. July-August 1983.
- Timmons, Richard F., "Lessons From the Past for NATO".
Parameters. Autumn 1984.
- Woodbury, Harry G. Jr., "Logistics: Dispersion
and Decision". Combat Forces Journal. December 1950.

END

DATE

FILMED

8-88

DTIC